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AFRL member swims English Channel; success not just 'stroke' of good luck

by Ron Fry, AFRL headquarters

LONDON — Captain Tim Lawrence has never shied away from a challenge.

Over the years, he's set high goals and challenged himself physically and mentally. He's climbed mountains in Colorado, got bruised and battered on the rugby field as a cadet at the U.S. Air Force Academy and studied endlessly to earn his Ph.D. in satellite engineering at the University of Surrey in England.

The Air Force Research Laboratory scientist is even challenged in his work as he searches throughout Europe for space-related technologies that will aid the Air Force as it transitions to an aerospace force for the 21st Century.

But one of the biggest challenges of his life came in the early-morning darkness of Sept. 4 when he stood on the shore of the English Channel, challenged by the prospect of swimming some 28 miles through choppy and chilly waters to the coast of France.

Fourteen hours and 59 minutes later, he had met the challenge and conquered it.

While records are incomplete, it is believed Lawrence is the first active duty U.S. Air Force member to swim the channel — a feat accomplished by less than 10 percent of those who try.

"When it was over, I was cold, tired and

(SEE SWIMMER/P.5)



NOT JUST A "STROKE" OF LUCK — Captain Tim Lawrence, an Air Force Research Laboratory scientist who searches Europe for space-related technologies, battles the chilly, choppy waters of the English Channel. He completed the 28-mile swim from England to France in about 15 hours.

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Fall 1999

Official voice of the Air Force Research Laboratory

Commander

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<http://intra.afrl.af.mil/news>

Brooks team caters to out-of-this-world appetite

by Rudy Purificato, Human Effectiveness Directorate

BROOKS AFB, TEXAS – There weren't any 'happy meals' aboard Apollo moon missions, but astronauts were satisfied with what scientists here had cooked up in catering to their gastro-nomic tastes.

The U.S. Air Force School of Aerospace Medicine pioneered space food development that became one of the most important life-support contributions made to America's space program.

"I remember one general asking, 'Why can't they (astronauts) just eat beef jerky?'" said retired Lt. Col. May O'Hara about the unusual space food proposal.

O'Hara, then the only female Air Force dietician involved in space food research, helped pioneer nutritional studies aimed at providing astronauts with balanced diets.

The school's space nutrition studies evolved from the aircrew in-flight feeding program begun in 1952 by the Aerospace Medical Research Laboratory at Wright-Patterson AFB, Ohio.

In 1960, NASA tasked the Air Force with developing space food for Project Mercury. The Wright-Patterson lab, in collaboration with the U.S. Army Natick Laboratories, developed bite-size food cubes and flexible food tubes containing semi-solids and liquids.

Concerned with spacecraft payload and safety issues, NASA engineers initially imposed strict requirements on food researchers. Space food had to be lightweight, compact, easily eaten in zero gravity and last without refrigeration up to six months at 100 degrees Fahrenheit.

Early paste-like food and food cubes were both unpalatable and impractical. Astronauts and food test subjects disliked early experimental diets. After three days of eating this food, an Air Force volunteer quipped, "The chow was good, but I wanted

(SEE APPETITE/P.5)

Find additional Fe@tures on the web.....

Neurocomputing helps to design new materials

'Honorary Commanders' visit Kirtland's Starfire range

Nascar drivers safe due to lab development

Manufacturing process could revolutionize parts casting

Assembly begins on first Airborne Laser flying platform

by Rich Garcia, Directed Energy Directorate

EVERETT, WASH. — U.S. Air Force and industry officials recently helped a Boeing-led industry team kick off the start of major assembly for the first Airborne Laser flying platform — a 747-400 freighter — at the Boeing assembly plant here.

An Air Force and industry team is developing a high-energy chemical oxygen-iodine laser that will be carried aboard a modified Boeing 747-400. The laser-equipped aircraft will be able to shoot down theater ballistic missiles launched hundreds of miles away.

Air Force plans call for a fleet of seven aircraft to be ready for rapid deployment within 24 hours to any spot around the globe. The fleet's mission is to deter potential use of theater ballistic missiles. More than 30 nations today are believed to have at their disposal more than 13,000 of those missiles. Many of those countries also are known to have or been developing nuclear, chemical and biological capabilities for their missiles.

Work also began on the freighter's main-deck floor grids, signaling the beginning of major assembly on the ABL platform. In addition, major assembly began on the wings, and airplane's body sections.

This initial aircraft is the first to be acquired for Air Force use under the military's new commercial "off-the-shelf" philosophy. The plane also is the third-ever Boeing 747-400 to use a new fuselage assembly process that significantly improves quality, reduces rejection tags and cycle time.

"I'm impressed with Team ABL's progress; the design is rock-solid and the technology proven," said Dr. Lawrence Delaney, the Air Force's top acquisition official. "The [ABL] is on-track to be on the leading edge of theater missile defense."

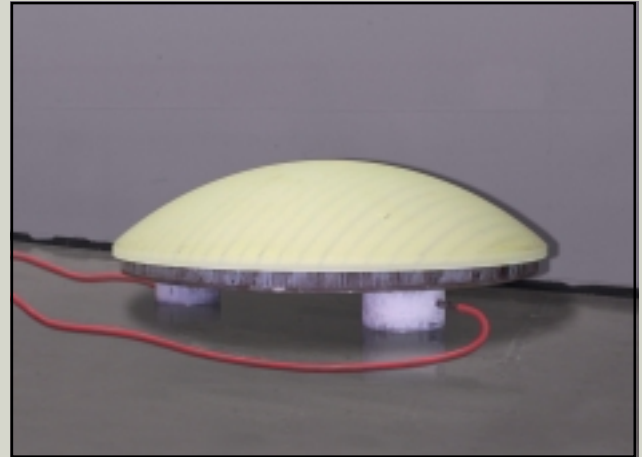
"Boeing has made ABL one of its top corporate commitments," said Jim Albaugh, president of Boeing Space & Communications Group. "Team ABL is an excellent example of doing business better and smarter by leveraging diverse technical expertise across industry to develop a remarkable system that will help maintain the peace."

As Team ABL leader, Boeing is responsible for creating the surveillance system, developing the battle management and command and control system, integrating the weapon system, and supplying the 747-400. Team member Lockheed Martin is developing the beam control/fire control system, and TRW is providing the chemical oxygen iodine laser and ground support.

"It is gratifying to see that real partnership produces real results," said Paul Shennum, Boeing vice president and Team ABL program director. "This contract was awarded in late 1996, and today we are marking the beginning of major manufacturing of the 747-400 platform for the first Airborne Laser."

"This is a real tribute to teamwork, to small teams, innovative ideas and hands-off leadership. We're building a great system that will give Americans a defense for the first time against theater ballistic missiles."

This aircraft will be the first U.S. Air Force aircraft of the new millennium. With major assembly beginning today, the



Laser receives optical-quality domed window

KIRTLAND AFB, N.M. — Airborne Laser officials here announced recently that they have accepted delivery of the largest optical-quality domed window ever manufactured.

This is a major step in the production of a turret window for the Airborne Laser, an aircraft that will use a laser to destroy missiles from hundreds of miles away.

The 340-pound conformal window measures 1.8 meters, nearly 6 feet, in diameter and incorporates unique materials to meet the stringent high-energy laser beam transmission requirements of the program.

Through this glass, which will be in the nose of a modified 747-400 aircraft, will pass the high-energy laser beam and illuminator laser beams used by the ABL to track and destroy ballistic missiles in their boost stage.

The window will be polished and shaped into its final configuration. Then it will be coated and installed into the composite turret ball located in the nose of the aircraft.

Final integration and test of the Lockheed Martin-built beam control/fire control system is scheduled for late 2001.

The Airborne Laser System Program Office operates from Kirtland AFB. This office heads an industry team led by the Boeing Company in Seattle, Wash.

Boeing has overall program management and system integration responsibilities. Boeing is also developing the battle management system and modifying the 747-400 aircraft. Those efforts will be done at their facilities in Seattle, Wash., and Wichita, Kan. TRW of Redondo Beach, Calif., is building the chemical oxygen-iodine laser and the related ground support subsystem. Lockheed Martin Missiles & Space is developing the beam control/fire control subsystem in Sunnyvale, Calif. @

747-400 freighter is scheduled to roll out from the Everett assembly line in December 1999. It then will be delivered to Wichita, Kan., for an 18-month modification program. @

Mid-air failures reduced by AFRL

by Francis L. Crumb, Information Directorate

ROME, N.Y. — Chafing in electrical and hydraulic conduits, which could lead to disastrous mid-air failures, may be detected in advance with technology identified by three members of Air Force Research Laboratory's Information Directorate.

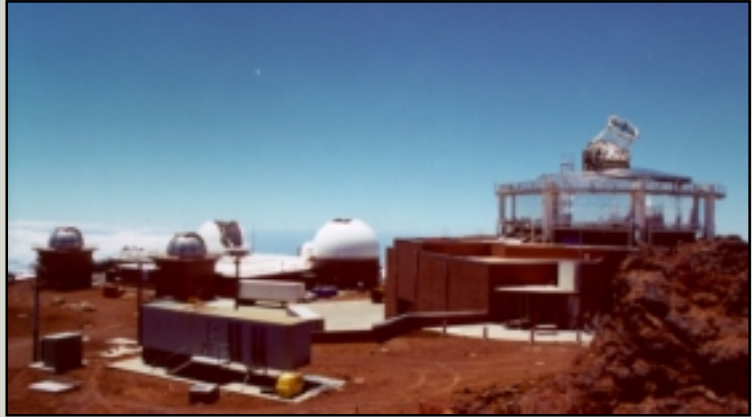
Frank Born, Roy Stratton and Capt. Raymond Harris of the directorate's Information Technology Branch have submitted an application to the U.S. Patent and Trademark Office for a patent on the technology.

"It's really rather old technology that evolved from some research we were conducting when our mission included electronics reliability," Stratton said. "Basically, the technique involves wrapping a fiber optic cable or piece of wire around the conduit you want to monitor. When a sensor breaks or short-circuits, you know you have dangerous chafing.

"This procedure can be used on anything where chafing is a concern," Stratton said. "We were thinking specifically about the 1996 crash of TWA Flight 800, where investigators have speculated that an electrical short in the center fuel tank caused a spark and subsequent explosion. Our technique will determine that something has chafed before you reach the point of catastrophic failure."

The technology is expected to be of prime interest to aircraft manufacturers concerned with chafing problems involving electrical systems in several models. However, the technology can also be applied to hydraulic or fuel lines where rupture or bursting can cause system failures and damage to surrounding materials.

"The use of these ideas could potentially prevent deadly mishaps and reduce the cost of examining cables for chafing to prevent such accidents," Stratton said. "In addition to cables, this method will detect chafing on any conduit-hydraulic hose, air-line, pipe or fiber optical bundle." @



INTRODUCING THE MAUI LAB — Attendees at a technical conference held in Maui were allowed to tour the most advanced telescope in the Department of Defense and the Maui High-Performance Computing Center. Both facilities are operated by the Directed Energy Directorate.

Conference focuses on Hawaii's Directed Energy telescope facility

by Rich Garcia, Directed Energy Directorate

MAUI, HAWAII. — More than 200 high-tech representatives from industry, academia and government attended a five day conference here from August 30 to September 3.

Participating space-surveillance leaders from around the world shared information on research activities that take place at the United States Air Force's telescope facilities atop Haleakala, a nearby 10,000-foot-high mountain.

The event focused on imaging and image processing, photometry and radiometry, laser-radar technologies, orbital debris, near-earth objects, astronomy and high-performance computing.

Attendees were allowed to tour the largest and most advanced telescope in the Department of Defense: 3.67-meter telescope known as the Advanced Electro-Optical System, managed by the Air Force Research Laboratory's Directed Energy Directorate at Kirtland AFB, N.M. Also available to tour was the directorate's Maui High-Performance Computing Center, operated for the Air Force by the University of New Mexico. This computing capability is among the DOD's top six computer centers.

The 3.67-meter telescope, which is scheduled to become fully operational next year, continues to receive enhancements. The telescope recently achieved "first light" on a recently installed adaptive optics system and in mid-month a science-grade visible imaging sensor was installed.

Earlier this summer, a long-wave infrared imager on the 3.67-meter telescope achieved "first light," capturing thermal images of Mars and the Hubble space telescope. This sensor also gathered lunar images, mapping temperature changes on the moon's surface as the moon went from being sunlit through the earth's shadow to full illumination again. Last month, this sensor was used to support the Lunar Prospector Impact mission.

AFRL commander, Maj. Gen. Richard R. Paul, opened the conference. Among the key speakers was U.S. Senator Daniel K. Inouye. @

Appetite (from page 2)

something I could chew.”

Astronaut complaints led to improvements. Food tubes were replaced by freeze-dehydrated food reconstituted with water. Bite-size food cubes were coated with a more digestible gelatin to prevent crumbling.

Following the last Mercury mission in which L. Gordon Cooper became the first astronaut to dine on freeze-dehydrated food, NASA realized it needed more durable food for longer-duration Project Gemini and Apollo flights. The Wright-Patterson lab launched a three-year research and development program that included various diet and human metabolism space studies.

In 1963, the Air Force transferred the space nutrition studies to Brooks. A school team of more than 40 medical, dietary and biological specialists continued these studies led by biochemist-nutritionist Dr. John Vanderveen.

An early NASA concern was weightlessness’ effects on food. “They were worried that food particles in zero gravity would float into spacecraft electronics, causing equipment damage,” says Clarence Theis, a Systems Research Laboratories technician

here and former space food research team member at the school of aerospace medicine.

“We were the first to test food in weightlessness,” said O’Hara. Having observed weightlessness’ minimal effects on eating, Vanderveen envisioned a feeding concept, later used on the moon, that was years ahead of its time.

Vanderveen came up with what later became the ‘spoon-bowl’ concept. Realizing cosmonauts had little difficulty eating food in space from cans using utensils, Vanderveen’s idea became a reality during early Apollo missions. Astronauts ate rehydratable food from plastic pouches with spoons.

NASA’s taste for investigating liquid food prevailed before Vanderveen’s idea was adopted. NASA was concerned about astronaut weight loss, dehydration and loss of blood vessel fluids experienced during Mercury and Gemini missions.

“We tested a variety of liquid diets,” O’Hara said. “They weren’t too satisfying.”

But one liquid food evaluated became the official drink of astronauts and an early commercial success. Theis said the scientists ran several tests on Tang, an orange juice replacement.

Acceptability was the primary issue in developing space food. “We felt a space diet ought to have a variety of foods that astronauts liked,” O’Hara said. “It was really exciting to be on the frontier of space. We felt we were making history.” @

Swimmer (from page 1)

numb. But I felt rewarded for all the long hours of hard training,” Lawrence said.

Lawrence is chief of space technology at the European Office of Aerospace Research and Defense in London, a detachment of AFRL’s Air Force Office of Scientific Research. He has been assigned there since completing his doctorate in 1998.

His job is to represent the laboratory and seek out European research efforts that could possibly lead to collaborative efforts with the Air Force.

It was during this assignment that he first became interested in swimming the channel. He began training and passed a series of tests administered by the Channel Swimming Association, qualifying him to attempt the swim.

Lawrence then contacted Freeda Streeter who had helped train her daughter, Alison, to swim the channel 38 times – the world record for most crossings. She developed a tough training program, which included drinking a high-carbohydrate mixture that Lawrence said tasted like “liquid wheat.”

His first attempt in 1997 ended with him surrendering to hypothermia after completing nearly 14 hours of the swim. He lost 20 pounds and was bedfast for two days. A second attempt in August 1998 ended when a storm blew into the channel causing the temperature to drop and halting the swim when he again suffered hypothermia.

“That’s when I told myself I probably didn’t have the physical ability to complete the swim,” the captain said. “I was extremely disappointed.”

The coach suggested a 28-mile route around New York City’s Manhattan Island in June, a 12-hour swim in the cold waters of

England’s Dover Harbor followed by a six-hour swim the next day. Lawrence completed both and was convinced he was ready to attack the channel.

He entered the water at about 5 a.m. Sept. 4. The temperature of the air would reach 80 degrees during the day, but the water temperature never climbed above 65. A steady wind kept the waves constant.

He headed for the coast of France and all went well until about the seven-hour point when he strained his right shoulder. Fearful that his boat pilot, following in an escort boat, might stop the swim because of the injury, Lawrence said nothing other than he was experiencing some pain. His coach passed him some Advil and he kept swimming.

Lawrence said the waves caused him to swallow a lot of sea water which upset his stomach, but he kept going until he reached the even colder waters at mid-channel. “That’s when my whole body went numb,” Lawrence said. “The boat crew said they could actually see my body change color.”

When Lawrence felt his feet touch the sandy bottom of Wissant Beach, France, he staggered onto shore and collapsed in a ball. “I couldn’t believe I was on French soil.”

Lawrence credited his coach, the boat crew and pace swimmer with helping him complete the swim. “They really made the difference at the end. They encouraged me to finish,” he said.

“I now feel a great sense of accomplishment,” Lawrence said. “I’d felt somewhat cheated on my first two attempts because I trained so hard and wasn’t able to finish. I now feel I’ve represented my office, the Air Force and my hometown well.”

“You can never quit,” Lawrence said. “That’s what life is all about, setting high, achievable goals. I believe anyone can swim the channel if they’re willing to set the goal and work hard.” @

C^aolumns

Commander's Corner



by Maj. Gen. Paul

October 1999

AFRL receives Von Karman Award

A few weeks ago, the Air Force Research Laboratory was presented the Air Force Association's highest honor in the field of science and engineering. I was both proud and delighted to be on hand at the AFA's National Convention to accept the Theodore Von Karman Award, on behalf of all the men and women of AFRL.

We received the award for continued innovative re-engineering, in the face of severe budget pressures, and for our demonstrated commitment to providing high quality technological support to the war-fighter. This support has been provided through teaming with industry, academia and the military customer, and through increased use of industrial research capabilities.

AFRL is leading the way in discovering, developing and transitioning technologies that will keep our Air Force the best in the world. Our people work hard with our partners in academia and industry to ensure we maintain technological superiority for the warfighter in the face of a changing global defense environment, and constrained resources.

Everyone in AFRL — technical and non-technical alike — should share in this honor. It's the dedication and creative minds of our men and women that enable us to fulfill our commitment to discover, develop, integrate and deliver affordable technologies for improved capabilities. Our people are our greatest resource. You are the key to the Air Force's future — and that is not an overstatement.

I want to take this opportunity to challenge you to continue to do the great job you have always done on behalf of our Air Force

and our nation. Seek out new opportunities to focus and fully exploit the considerable talents of our people toward developing leading edge technologies.

The people of AFRL are the key to our success, and I couldn't be prouder of you. You are truly deserving of this award — each and every one. Thank you and congratulations! @

November 1999

AFRL chooses five as Fellows

The Air Force Research Laboratory recently chose five of its scientists and engineers as AFRL Fellows. It's most appropriate that we recognize these people at this time for receiving the highest honor we can bestow.

Dr. Charles Y-C Lee, of the Air Force Office of Scientific Research, Dr. Richard W. Linderman, of the Information Directorate, Dr. Melvin C. Ohmer, of the Materials and Manufacturing Directorate, Dr. LaVerne A. Schlie, of the Directed Energy Directorate, and Dr. Michael C. Wicks, of the Sensors Directorate, make up this year's class of inductees.

These five people were recently honored during a day-long event at the Engineers Club of Dayton. They were recognized for outstanding contributions in research and technology development. Dr. Hans Mark spoke at the evening banquet and reinforced the importance of the contributions of AFRL's internal workforce.

These Fellows are AFRL's top researchers. They lead special activities which enhance the laboratory's image and they advise me on substantial issues. This year's inductees are nationally and internationally recognized experts in the areas of polymer and organic materials research, electrical and magnetic properties of materials, high performance computing architectures, and radar and laser technologies. Their work has been recognized in the scientific community as pioneering breakthroughs.

The continued contributions of these people have led to significant achievements in important Air Force programs. Their work has resulted in major changes in the way we do things and it's part of the reason why we can continue to maintain the technological advantage which keeps our forces the best in the world.

I'm extremely proud to have talented people of this caliber on our team. They join an elite group of prior Fellows — the "best of the best" — who truly are among the finest scientists and engineers in the world. I want to congratulate each of our Fellows, and I encourage you to do the same.@

C^aolumns

Headquarters Highlight

The proof is in print with *AFRL Technology Horizons*
by Susan Wapelhorst, AFRL Corporate Communications

One of AFRL's goals has always been to stimulate the scientific community and ultimately the economy with innovative research and technology ideas.

AFRL has worked with industry and academic partners in the past to share ideas that will exhibit and advance the strong science and technology going on in, or sponsored by, the lab. In keeping with this tradition, AFRL has created a direct connection, in the form of published communication, that will serve as a gobetween for AFRL and its scientific peers.

A brand new AFRL technical publication, *AFRL Technology Horizons*, will serve as the conduit for sharing our technical ideas with others who engage in research activities. Landing on the doorsteps of 200,000 subscribers from government, academia and industry, it will feature "selected science and technology articles" from across our organization. The magazine is patterned after *NASA Tech Briefs*.

Major General Dick Paul has commented about the importance of the publication.

He said, "I am becoming more enthusiastic about this project every time I see its maturation. It fills an important niche by allowing our technical people and contractors to write short, technically-oriented articles."

Paul said that the magazine will complement existing Corporate Communications programs such as the Success Stories program, and added that "it will have a profound positive impact on AFRL's corporate image."

The Program management, editing and publication is performed by the AFRL Corporate Communications Branch and their contractor, Veridian, while articles are submitted by scientists and engineers from AFRL's Technology Directorates. This provides an avenue for AFRL scientists and engineers, as well as contractors, to publish short technical articles of significance and interest to other aerospace scientists and engineers in the aerospace community.

Submitting articles to the publication is a tremendous opportunity for AFRL S&Es for a couple of reasons. First and foremost, the submitted articles will give authors an

opportunity to communicate about their ideas, theories and expertise with a broad technology based audience. Publishing will also give AFRL S&Es the opportunity to earn credit towards the Contribution-based Compensation System.

Published articles will be supplemented by a Technical Support Package (TSP). The TSPs will be made available via the World Wide Web for those who seek more information on the subject of each article.

The package will include: official reports, white papers, articles, status reports, research papers, or any other published product that provides potential readers with additional information on the subject matter. They must also be cleared for public release and have a public affairs security and policy review.

The magazine will contain many different types of articles, the most significant of which are the technical articles submitted by S&E's. However, it will also contain feature articles and sections/departments that focus on technology transfer, upcoming or

recent AFRL conferences, specific directorates, requests for proposals, facilities, broad agency announcements, interesting commercial applications and other topics.

Though the publication staff will be soliciting specific contributions and give priority to rapidly changing technologies, they will continuously accept unsolicited technical and feature articles from AFRL members. In fact, the publication affords the opportunity for any AFRL program to "advertise," as space allows, in its pages.

To date, 40 articles have been submitted to Technology Horizons. If a contractor, scientist or engineer is interested in submitting an article, they should follow the guidance in the draft Operating Instructions on the *AFRL Technology Horizons* web site.

Technology Horizons will be published quarterly, with the first publication scheduled to debut in March 2000.

For more information about Technology Horizons, visit our web site at <https://intra.afrl.af.mil/technologyhorizons/index.htm> or contact Ms. Susan Wapelhorst at susan.wapelhorst@afrl.af.mil or DSN 785-0065. @



Columns

CDO Briefs

Leadership workshop gives strategy life by CDO Council

One of 300 AFRL leaders who has attended the Strategic Leadership Workshop said, "This is the first time in my career I got the impression the boss really wanted to give his strategy life."

The AFRL Corporate Development Office designed this series of workshops, which is designed for supervisors, managers, team leaders and technical advisors, to help leaders understand their role in the future success of the laboratory. Leaders leave their workshop with a better appreciation for cross AFRL collaboration and realize that the lab's success depends on all facets of the organization working together towards a common vision.

The focus of the Workshop is on *leadership core competencies* – those skills, which are linked to the AFRL Corporate Strategy, that enable AFRL "to discover, develop, integrate and deliver affordable technologies for improved war-fighting capabilities by leading a partnership of government, industry and academia to keep our Air Force the best in the world." AFRL Corporate Board members have recognized that there are leaders at all levels of the organization, responsible for transforming the good words of a corporate strategy into *real* technology, *real* programs and *real* capabilities, in spite of *real* resource constraints.

They also recognize that this is a *tough job* – one demand-

ing a set of personal, interpersonal and strategy skills that must be consciously developed, matured and periodically reassessed if leaders are going to be effective in the quest.

Thus, the Strategic Leadership Workshop is designed as an interesting, safe forum for focusing time, energy and thought on leadership for the *real* world. This is a workshop, not a training course. Leaders from all parts of the organization interact with other AFRL leaders in discussions of key AFRL leadership issues. They focus on specific issues of concern to the lab and the people working in the lab.

Some of the questions leaders wrestle with during the workshop are: How to really impact Air Force decision makers; What is the ideal workforce make-up needed to successfully meet customer requirements while still advancing technology?; What are the trends in business operations that will shape and impact how we do research and development in the future?

While firmly grounded in academic and professional leadership and organizational theory, the Strategic Leadership Workshop is *not* "Leadership 101." No one stands up to teach or preach because there are few one-size-fits-all approaches that work in our complex technical, organizational and security environment. Thinking, exploring and learning are encouraged through experiential activities including simulations, written instruments, small group discussions and the exploration of models. Some of these tools are Commercial Off-The-Shelf, others have been created/tailored to the AFRL environment.

The workshop was designed and developed by the AFRL CDO Council, a group of internal and external organizational development (OD) consultants from across the lab. The function of CDO Council is to act as a catalyst for ongoing corporate development and to serve as a unifying focal point of corporate development efforts across the directorates.

Each technical directorate has one internal Corporate Development Officer residing in the organization. These consultants along with the AFRL CDO office and two external OD consultants make up the AFRL CDO Council. They are a resource available to each person in AFRL.

The CDO Council has completed 11 of the 14 workshops scheduled for this year and have committed to conduct additional sessions in 2000. If you have questions about this workshop or other OD topics, contact your organizational CDO, they are here to help. @



TD Spotlight--

Air Vehicles Directorate: Aviation legacy for a 2000+ aerospace force

by Carol Young, Air Vehicles Directorate

WRIGHT-PATTERSON AFB, OHIO - If it flies, the Air Vehicles Directorate (VA) and its predecessors probably have a fingerprint on it!

Steeped in tradition and a depth of expertise, VA has led the world in advanced aircraft technology for more than 60 years. The directorate continues to apply this experience in sustaining our nation's current fleet. In addition, VA is postured to contribute to the next generation of aerospace weapon systems for future war-fighters.

Air Vehicles Directorate's business strategy is guided by the requirements to provide affordable, revolutionary capabilities to the war-fighter that address all future threats. The emphasis and vision are on technology investments that support cost effective, survivable aerospace platforms that are capable of accurate and quick delivery of a variety of future weapons or cargo anywhere in the world.

To achieve this vision, the directorate is organized, and will focus on, four primary areas that are identified as core competencies: Aeronautical Sciences, Control Sciences, Structures and Integration. The Aeronautical Sciences competency focuses on computational sciences, aero-configuration, and plasma physics and aerodynamic relationships. Control Sciences focuses on distributed network feedback systems and develops system and swarm control theories. The goal of this competency is to control swarms of Unmanned Air Vehicles (UAV's), satellites and munitions.

The Structures competency combines loads, thermal and acoustic environments, works on computation and analytical certification, and determines multifunctional affordable structures. This work is critical to the future of Air Force aerospace systems. Finally, Integration focuses on multi-disciplinary design and demonstration, modeling and simulation based research and development. This includes virtual design, which allows scientists to mold and study an aircraft by computer before the metal is bent.

VA also houses two Centers of Excellence which are globally recognized for their expertise in computational sciences and control theory. A third center for multi-disciplinary technologies is being organized to invent and develop new and improved theories and processes enabling revolutionary aerospace vehicle capabilities for our user commands.

Air Vehicles' new business process utilizes an integrating concept approach that focuses air vehicle resources and



technologies to provide future capabilities in the areas of:

- Sustainment - Technology insertion to extend today's fleet to meet tomorrow's war-fighter needs
- Uninhabited Air Vehicles - Technologies to enable routing operation of high payoff UAV alternatives across the full spectrum of warfare
- Trans-Atmospheric and Space - Affordable space access and quick reaction trans-atmospheric capability

Each year, VA invests in long-term research in air vehicle related science and engineering through in-house research, contracts to industry and other AFRL directorates. VA's annual budget includes approximately \$70 million in Air Force funding and another \$80 million in additional non-AFRL funding.

Among VA's 294 scientists and engineers, 20 percent hold doctorates, 37 percent possess a master's degree, and 43 percent record a bachelor's degree in scientific or engineering disciplines.

The directorate is our nation's lead organization for Air Force air platform technology. Air Vehicles is a strong technical organization, with emphasis on technology transition and transfer programs as well. In addition, the directorate uses a balanced investment of resources, based on teamwork with partners who work multi-disciplinary solutions, to support its customers.

For more information about this directorate, visit its web site at <http://www.afrl.af.mil/va.html>. @

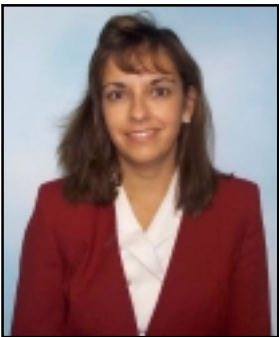
Net Index

Due to the number of submissions we receive, some sections of *news@afrl* are available exclusively on-line. The on-line version of the newsletter allows users to view the AFRL corporate calendar, news releases generated by AFRL headquarters, operating instructions, L@b L@urels and Roundups sections.

The L@b L@urels section of the electronic newsletter is dedicated to members of Air Force Research Laboratory who receive awards and honors. The Roundups section of the electronic newsletter keeps Air Force Research laboratory employees informed about contracts AFRL has awarded. Below is an index of articles one can find in each of these on-line sections.

L@b L@urels

- Maurice wins AIAA chairman's award for efforts



Dr. Lourdes Maurice

- Five inducted as AFRL fellows at Wright-Patt
- Air Force awards college team for aviation design
- Propulsion officer lands distinguished grad award
- Directorate wins award for strike fighter acquisitions
- Lab receives Air Force Association science award
- Design of lighter aircraft comes from new approach
- Former Sensors director assumes position at Eglin
- Hawkins named Propulsion scientist of the year
- Morris and Buchhalter win tech transfer award
- Nearly two dozen directorate volunteers honored

Roundups

- AFRL, academia couple to develop computer forensics
- Award given to speed up analog-to-digital converters
- Software tools will support ARGUS, identify intrusions
- Tool will assist in management of chemical warfare
- Collecting signal intelligence focus of contract
- New approach to cyber-attack employed at directorate
- Intrusion detection system to be integrated at AFRL
- Directed Energy signs agreement for laser development
- Engaging moving targets is the goal of two contracts
- Negotiating teams to solve AFRL scheduling problems
- Contract ensures the efficiency of programmable logic
- Directorate reconfigures firewalls to conserve security
- \$15 million awarded for AFRL intelligence support

To view the full text of these and other articles visit the *news@afrl* page on the Intranet.

To submit L@b L@urels or Roundups from your directorate, send a query to:

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